

### REMARKS

In reply to the Final Office Action of January 7, 2010, Applicants have not amended or deleted any claims. New claims 32-40 have been added. Accordingly, claims 1-11 and 13-40 are pending, with claims 1, 5, and 9 in independent form.

Claims 1, 4, 9, 13-14, 24-27, and 29 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hamakawa et al. (U.S. Patent No. 4,820,915, "Hamakawa") in view of Ovshinsky (U.S. Patent No. 4,713,493, "Ovshinsky"). Independent claim 1 covers radiation detectors that include an active region featuring "a plurality of functional layers, at least two of said functional layers having different band gaps, each one of the functional layers being implemented to absorb at least some of the radiation." The Action admits that Hamakawa does not disclose functional layers with different band gaps in an active layer of a detector, but alleges that Ovshinsky teaches this subject matter, and that a person of ordinary skill in the art would have combined Hamakawa and Ovshinsky (Action at page 3). Applicants respectfully disagree, for at least the following reasons.

To support its argument, the Action references column 8, lines 3-4 of Ovshinsky. Applicants have reviewed this portion of Ovshinsky, but do not agree that it teaches the subject matter that the Action admits is absent in Hamakawa. Ovshinsky discloses that triads can be formed consisting of "two layers of oppositely doped semiconductor material having a layer of substantially intrinsic semiconductor material interposed therebetween" (Ovshinsky, col. 7, lines 62-64). Ovshinsky further states that "the photovoltaic body includes a plurality of said triads in superposed, electrical and optical series relationship [with] a transparent electrically conductive layer ... ohmically disposed between each of said adjacent triads" (Ovshinsky, col. 7, line 65, through col. 8, line 2). Ovshinsky goes on to state that the "intrinsic layers of at least two of the triads may be fashioned so as to have band gaps optimized to absorb different wavelengths of the solar spectrum" (Ovshinsky, col. 8, lines 2-4).

Ovshinsky is clear that the "electrically conductive layer" is "ohmically disposed" between the triads in his detector. In other words, Ovshinsky's electrically conductive layer acts as an electrical conduit between different triads to facilitate charge transport. As best Applicants

can determine, the structure of Ovshinsky's detector is such that triads having different band gaps can be linked by electrically conductive regions. This structure differs significantly from the structure of the active region recited in claim 1, in which a (single) active region includes "a plurality of functional layers, at least two of said functional layers having different band gaps." Ovshinsky's detector instead includes *multiple* active regions (e.g., triads), each of which can be linked to another active region via a conductive layer. As discussed above, Ovshinsky's active regions (e.g., triads) do not include his conductive layers; each triad instead consists of "two layers of oppositely doped semiconductor material having a layer of substantially intrinsic semiconductor material interposed therebetween" (Ovshinsky, col. 7, lines 62-64).

Therefore, without conceding that a person of ordinary skill in the art would find any reason to combine Hamakawa and Ovshinsky in the manner proposed by the Action, Applicants believe that even if Hamakawa and Ovshinsky were combined, the result would not yield the subject matter of claim 1. Instead, the combination of Hamakawa and Ovshinsky would yield a detector that includes multiple active regions, each with a particular band gap, linked by one or more conductive layers that are not part of the active regions. Accordingly, Applicants submit that claim 1 is patentable over the combination of Hamakawa and Ovshinsky, and respectfully request reconsideration and withdrawal of the rejection of claim 1 under 35 U.S.C. § 103(a).

Independent claim 9 covers radiation detectors that include "a semiconductor body with an active region," where the active region "comprises a plurality of functional layers, at least two of said functional layers having different band gaps and each of the functional layers is implemented to absorb at least some of the radiation." The Action admits that Hamakawa does not disclose functional layers with different band gaps in an active layer of a detector, but alleges that Ovshinsky teaches this subject matter, and that a person of ordinary skill in the art would have combined Hamakawa and Ovshinsky (Action at page 5).

Applicants respectfully disagree, for at least the same reasons discussed above in connection with claim 1. Specifically, without conceding that a person of ordinary skill in the art would find any reason to combine Hamakawa and Ovshinsky in the manner proposed by the Action, Applicants believe that even if Hamakawa and Ovshinsky were combined, the result would not yield the subject matter of claim 9. To the contrary, if Hamakawa and Ovshinsky were combined, Applicants believe that the resulting detector would include multiple active

regions, each with a particular band gap, linked by one or more conductive layers that are not part of the active regions, rather than an active region that includes "at least two ... functional layers having different band gaps," as claim 9 requires. Accordingly, Applicants submit that claim 9 is patentable over the combination of Hamakawa and Ovshinsky, and respectfully request reconsideration and withdrawal of the rejection of claim 9 under 35 U.S.C. § 103(a).

Claims 4, 13-14, 24-27, and 29 each depend from one of claims 1 and 9, and are therefore patentable over Hamakawa and Ovshinsky for at least the same reasons discussed above. Applicants also therefore respectfully request reconsideration and withdrawal of the rejections of these claims under 35 U.S.C. § 103(a).

Claims 2 and 10 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hamakawa in view of Keller (U.S. Patent No. 5,406,067, "Keller"). Without conceding that a person of ordinary skill in the art would find any reason to combine Hamakawa and Keller, Applicants note that claims 2 and 10 depend from claims 1 and 9, respectively. As discussed above, neither Hamakawa alone, nor Hamakawa in combination with Ovshinsky, discloses or suggests the subject matter of claims 1 and 9. Keller does not cure the deficiencies of Hamakawa and Ovshinsky, at least because Keller does not disclose or suggest an active region that includes "at least two ... functional layers having different band gaps," as required by claims 1 and 9. Thus, Applicants believe that claims 1 and 9 are patentable over Hamakawa, Ovshinsky, and Keller.

For at least the same reasons, claims 2 and 10 are also therefore patentable over Hamakawa, Ovshinsky, and Keller. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections of claims 2 and 10 under 35 U.S.C. § 103(a).

Claims 3, 5-8, 11, 15-23, 28, 30, and 31 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hamakawa in view of Figueroa et al. (U.S. Patent No. 5,406,067, "Figueroa"). Applicants respectfully disagree with these rejections, for at least the following reasons.

Applicants note first that claims 3, 21-23, 28, and 30 depend from claim 1, and that claims 11 and 15-20 depend from claim 9. Without conceding that a person of ordinary skill in the art would find any reason to combine Hamakawa and Figueroa, Applicants have discussed above that neither Hamakawa alone, nor Hamakawa in combination with Ovshinsky, discloses or

suggests the subject matter of claims 1 and 9. Figueroa does not cure the deficiencies of Hamakawa and Ovshinsky, at least because Figueroa does not disclose or suggest an active region that includes “at least two ... functional layers having different band gaps,” as required by claims 1 and 9. Thus, Applicants believe that claims 1 and 9 are patentable over Hamakawa, Ovshinsky, and Figueroa.

For at least the same reasons, claims 3, 11, 15-23, 28, and 30 are also therefore patentable over Hamakawa, Ovshinsky, and Figueroa. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections of claims 3, 11, 15-23, 28, and 30 under 35 U.S.C. § 103(a).

Second, independent claim 5 covers radiation detectors “for detecting radiation in accordance with the predefined spectral sensitivity distribution of the human eye” and that include a semiconductor body with an active region that “contains at least one III/V semiconductor material” and “a plurality of functional layers,” each one of which is “configured to absorb at least some of the radiation.” The Action admits that Hamakawa does not disclose detectors that include III/V semiconductor materials, but alleges that Figueroa teaches this subject matter, and that it would have been obvious to a person of ordinary skill in the art to combine Hamakawa and Figueroa (Action at pages 9-10). Applicants respectfully disagree, for at least the following reasons.

Figueroa discloses an integrated waveguide and detector that uses GaAs and AlGaAs (Figueroa, col. 2, lines 14-15). Figueroa discloses that these layers operate at optical wavelengths of between 0.6 and 0.9  $\mu\text{m}$ , or between 1 and 1.5  $\mu\text{m}$  (for InP) (Figueroa, col. 2, lines 19-24). Claim 5 covers detectors for detecting radiation “in accordance with the predefined spectral sensitivity distribution of the human eye.” As shown in Figure 2 of the present application, for example, this spectral sensitivity distribution includes significant contributions from wavelengths below 0.6  $\mu\text{m}$ . In particular, the majority of the distribution in Figure 2 falls at wavelengths below 0.6  $\mu\text{m}$ . That is, many colors – including radiation in the green, yellow, and blue regions of the spectrum – are detected by the human eye.

But Figueroa's devices do not operate in these regions of the spectrum. Figueroa's devices instead only operate toward the red edge of the visible portion of the spectrum, where the sensitivity of the human eye falls off rapidly. Thus, Applicants believe that a person of ordinary

skill in the art, seeking to construct a detector “for detecting radiation in accordance with the predefined spectral sensitivity distribution of the human eye,” would not look to Figueroa, as Figueroa’s materials are not operative throughout much of the spectral region that corresponds to the sensitivity distribution of the human eye. Moreover, Figueroa’s materials might be operative and provide strong detector signals in spectral regions (e.g., between 0.8  $\mu\text{m}$  and 0.9  $\mu\text{m}$ ) in which the human eye is relatively insensitive. In view of the foregoing, Applicants believe that a person of ordinary skill in the art would have found no reason to combine Hamakawa and Figueroa as the Action alleges, as Figueroa’s materials would have been perceived as unsuitable for “detecting radiation in accordance with the predefined spectral sensitivity distribution of the human eye,” as claim 5 requires.

Further, even if the combination of Hamakawa and Figueroa was attempted, it is not at all clear that it would be possible to combine these references. Hamakawa’s sensors are formed of silicon (see, e.g., Hamakawa, col. 2, lines 54-55), whereas Figueroa discloses the use of GaAs and AlGaAs as discussed above. These are two different semiconductor material systems, and it is not at all obvious that they can be combined with one another without introducing problems (e.g., mechanical delamination of layers). As neither Hamakawa nor Figueroa teaches how to combine these different systems, Applicants believe it cannot be fairly stated that such a combination would have been solely within the skill of a person of ordinary skill in the art.

For all of the foregoing reasons, Applicants submit that claim 5 is patentable over Hamakawa and Figueroa. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of claim 5 under 35 U.S.C. § 103(a). Claims 6-8 and 31 depend from claim 5, and are patentable over Hamakawa and Figueroa for at least the same reasons. Therefore Applicants also respectfully request reconsideration and withdrawal of the rejections of claims 6-8 and 31 under 35 U.S.C. § 103(a).

New claims 32-40 have been added in this reply. Claims 32-34 cover radiation detectors in which “the active region corresponds to a continuous, intrinsic region of the semiconductor body.” Support for these claims can be found, for example, in the specification at page 7, paragraph 5, and in Figure 1, which shows that active region 5 is formed by layers 4a-4d.

Claims 35-37 cover radiation detectors in which “the functional layers are epitaxial layers that form a monolithically integrated active region.” Support for these claims can be found, for example, in the specification at page 10, paragraph 2.

Claims 38-40 cover radiation detectors in which “the functional layers are consecutive layers in a layer stack, and wherein each functional layer is in direct contact with adjacent functional layers in the layer stack.” Support for these claims can be found, for example, in the specification at page 9, paragraph 3, at page 11, paragraph 9 (carrying over onto page 12), at page 14, paragraph 4, and in Figures 1 and 3.

Claims 32-40 each depend from one of claims 1, 5, and 9, and are therefore patentable for at least the same reasons discussed above. Accordingly, Applicants respectfully request that these claims be allowed.

In view of the foregoing, Applicants ask that the application be allowed.

Canceled claims, if any, have been canceled without prejudice or disclaimer. Any circumstance in which Applicants have: (a) addressed certain comments of the Examiner does not mean that Applicants concede other comments of the Examiner; (b) made arguments for the patentability of some claims does not mean that there are not other good reasons for patentability of those claims and other claims; or (c) amended or canceled a claim does not mean that Applicants concede any of the Examiner's positions with respect to that claim or other claims.

This reply is being filed together with a Request for Continued Examination (RCE). Fees for the RCE and for the Petition for Extension of Time are being paid concurrently on the Electronic Filing System (EFS) by way of Deposit Account authorization. Please apply any other charges or credits to Deposit Account 06-1050, referencing Attorney Docket No. 12406-0213US1.

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Respectfully submitted,

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